EFFECTS OF SAMPLE TASTE-TESTING ON GLUTEN FREE AWARENESS AND THE LIKELIHOOD TO PURCHASE UDI'S GLUTEN FREE PRODUCTS ON CAL POLY SAN LUIS OBISPO'S CAMPUS

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INTRODUCTION

Celiac disease is becoming an increasingly recognized autoimmune pathology of the intestine caused by permanent intolerance to gluten (Niewinski 2008). For those with Celiac disease, or gluten intolerance, gluten-free foods are hard to come by, especially on college campuses. Eating gluten free products has positive health effects on numerous diseases. It has been shown that eating gluten free foods can help alleviate symptoms of numerous diseases such as ADHD, autism, and type 2 diabetes (UDI's Gluten Free website 2012). Throughout the past few years, more gluten free companies have been advocating to promote their products on college campuses for people with intolerances. UDI's Gluten Free Foods is one such company, which has developed a special interest in promoting, marketing, and selling their products on several college campuses.

UDI's chooses ambassadors for each college campus to help promote their products; Cal Poly San Luis Obispo is fortunate enough to have been one of those campuses. Ambassadors set up sample taste-testings on campus, spread awareness about gluten intolerances and gluten free products, and educate students on the benefits of using and selling gluten free products on college campuses. Selling and

promoting more gluten free foods on Cal Poly's campus enables individuals with gluten intolerances to have better food options to maintain their health needs. If colleges begin to implement gluten free products and options into their campus dining systems, it will benefit the students as well as the college because they will be filling a consumer demand that is steadily increasing (Spins 2005).

When a college is able to adhere to special needs of their students, it does not go unrecognized. It creates a much easier and less stressful environment for those effected by the disease when eating options are made available, which permit students to live a healthier lifestyle. It is important for college campuses to create comfortable environments for its students and to provide the tools, in this case food, necessary for students to thrive.

Problem Statement

Will sample taste-testings, increase awareness of gluten free products and the likelihood of purchasing Udi's gluten free products on Cal Poly San Luis Obispo's campus?

Hypothesis

I believe that the process of using sample taste-testings will increase awareness of gluten free products and the likelihood of purchasing Udi's gluten free products on Cal Poly's campus.

Objectives

1.) To research and evaluate the target market of UDI's Gluten Free products throughout the Cal Poly campus as well as conduct and implement a survey around the Cal Poly campus to determine existing awareness and need for gluten free and UDI's products.

2.) To create awareness about the positive aspects of being gluten free and using gluten free products around college campuses.

3.) Compile the results of the survey and analyze them in a professional manner in order to prove the hypothesis correct.

Justification

Celiac disease is an autoimmune disease triggered in genetically prone individuals following ingestion of the gluten contained within wheat, barley and rye, causing damage to the intestinal mucosa results in impaired nutrient absorption (Singh & Whelan 2011). The disease affects approximately one percent of the population of many developed countries; however its true prevalence may be masked by individual variation in the range and severity of symptoms (Fasano & Catassi 2001). The main treatment for celiac disease is a strict, gluten free diet. This can be achieved by eating solely naturally gluten free foods, such as UDI's products.

Wheat is a staple in many western diets that is commonly used in order to make bread, thickeners, binders, or bulking agents (Henderson *et al.,* 2002). Therefore, total exclusions of foods containing gluten can be extremely difficult to one's diet. A quality of life study was done in patients with celiac disease and consumers reported having major problems in determining whether foods were

gluten free (85% people) as well as finding gluten free foods in stores (83% people) (Zarkadas *et al.* 2006). According to a SPINS report on Gluten Free product sales (2005), the demand and need for more gluten free products has increased by $79.22M in 2004 and continued to grow as much as 13% in 2005. It is vitally important to increase the accommodations available to people with these gluten intolerant diseases and to allocate options for them to maintain a healthy and balanced diet.

UDI's is working toward doing this very thing, with its focus on college campuses. Cal Poly State University is fortunate enough to be one of those college campuses. By creating a more "gluten-free friendly" environment, both students and faculty of Cal Poly whom are unable to consumer gluten are permitted more choices and availability on campus. Many colleges around the country deal with lack of access to gluten free products on their campuses. In an article from the Occidental Weekly, Kristen Wright discusses the difficulty of finding gluten free food on her campus and gives options of better ways to advertise and promote. The main points in this article demonstrate the effect of the lack of advertisement and awareness gluten free products have around other campuses as well. It also shows the need students have for their school to provide more gluten free products and awareness. The results of this survey and analysis will help to determine the positive effects of more gluten-free products on Cal Poly State University's Campus as well as allow for more awareness of UDI's gluten free food products.

In order to understand the importance of creating this survey and analysis in order to create a larger gluten free awareness throughout Cal Poly's campus, it is imperative to comprehend the extent to which Celiac disease and its complications affect the population. A study conducted by Rubio-Tapia, et al (2012) found Celiac disease affected 1 in 141 people in the United States. This, while relatively speaking may seem like a small number, is in actuality, quite large. When a disease such as celiac disease is easily preventable through awareness and education, it is important to see this number as significant. Through education around college campuses in the U.S., celiac disease can be given greater awareness because the students who are affected by the disease understand the detriments caused by a lack of knowledge and awareness. Because of the large population affected by celiac disease, it is important to adhere to the complications brought about by the disease and to create and incorporate more gluten-free food options to U.S. college campuses. It was discussed in a study by Freeman (2009) that awareness of celiac disease has increased, however it still remains distinctly underdiagnosed. By creating more awareness through market surveying, analysis, and research, a more accurate diagnosis may occur.

Chapter 2

LITERATURE REVIEW

For those with celiac disease or gluten intolerances, gluten free foods are hard to come by, especially on college campuses. Eating gluten free products have had incredible positive health effects on numerous diseases. Throughout the past few years, more gluten free companies have been advocating to sell their products on college campuses for people with intolerances. By developing a survey and analysis approach through conducting a survey and sample taste-testings around Cal Poly's campus, more gluten free awareness and knowledge of UDI's products will be brought to Cal Poly's campus.

Similar studies have been done through senior projects of Cal Poly students in the past. An effective business plan for a juice bar in Paris, France was created through research on how to maximize profits, minimize costs, as well as taking internal and external forces and risks into account (Silverman 2011). Different calculations such as NPV (Net Present Value), forecasted financial statements, and SWOT analysis were used to create this business plan. By modeling and analyzing my marketing approach in a similar manner to that

of this student, an effective marketing strategy will be created in hopes of increasing awareness around campus.

Another senior project was done on the feasibility of a sit-down restaurant in Ventura. A survey was conducted to analyze and find Ventura's target market in relation to a sit-down type of restaurant (Wassil 2011). Creating a survey such as this student's will be helpful in finding the target market of gluten free products in order to create a more effective approach to increase awareness around campus.

In order to reach the correct market when creating a marketing survey and analysis for UDI's company, numerous surveys, research, and analysis must be conducted on the topic and the population in which it is relevant to. In a study done in San Francisco, two procedures were developed and contrasted to show how product supply and demand can be used to determine the geographic extent of markets (Brooks 1995). This research shows ways in which finding the geographic market for UDI's products can be done. Through using both natural market and enactment approaches, the target market for UDI's products on Cal Poly's campus may be found. Another research study, found in *Management Science,* describes how the profits of a company are higher if prior knowledge about consumer tastes is well known (Hess and Lucas 2004). By creating a survey and conducting it on campus, an increase in knowledge about the consumer tastes will take place along with an increase in potential profits and awareness of UDI's products.

In a study by Slater and Narver (1998), it is said that it is important and most beneficial to become market-oriented regardless of market conditions and will in turn increase revenue (Slater and Narver 1998). Becoming more market-oriented and determining a target market through this research will help to increase awareness even further. It was found that in dynamic competitive markets, such as the food industry, interactions between competing brands should be identified to optimize a business (Naik, Raman, Winer 2005). This information must be taken into account and UDI's competing brands and markets must be looked into when creating an analysis to determine awareness in order to produce the highest amount of understanding.

In order to gain knowledge on the target market of UDI's products in order to create awareness around Cal Poly's campus, the use of in-person surveys as well as the use of sample taste-testing demonstrations is essential. In many previous studies, it has been claimed that allocating sample taste-testing demonstrations results in the acceleration of a products' sales and awareness (Bawa and Shoemaker 2004). Using sample taste-testing demonstrations with UDI's products will have the same affect and allow for previous stigmas or prejudices against gluten free products to diminish. However, when using sample taste-testing, there may be problems and errors that occur. It is important to understand that the primary factor detracting from the reliability of taste tests, discovered in a study by Givon (1989) is the ability of the subject to randomly guess instead of basing the answer on what they actually think they

taste. To steer clear of the subjects' guessing it is important to understand the ways into making a sample taste-testing demonstration more reliable. Givon (1989) concluded in his study that in order to make a test more reliable it is crucial to increase the respondent's task difficulty. Although this may subtract from the subjects willingness to take the test, it will in turn be overshadowed by the greater reliability of the test.

By using these previous studies and information related to the topic of creating a survey and analysis to increase consumer awareness, the research project will have the ability to build off of previous studies and findings to learn from mistakes already made. Basing the surveys, sample taste-testing demonstrations, and target market and demographic research and analysis on previous studies will make these sources of data more beneficial and reliable when analyzing and creating a greater awareness. It will also help to avoid making the same mistakes and help to change the weaknesses that were discovered in studies done in the past.

Chapter 3

METHODOLOGY

Procedures for Data Collection

Although there are many colleges throughout the U.S. that may already sell or still need to sell gluten free and Udi's products, the focus of this data collection was primarily focused toward the students of Cal Poly. Surveys will be collected in numerous locations on campus. These sites will be in front of the library, the Recreation Center, and in a variety of dining services on campus including; the Avenue, Vista Grande, Sandwich Factory, Subway, Campus Market, and near the food services in Poly Canyon. These locations around the campus were chosen in order to attain an unbiased variety of students to sample while still making sure the students attend Cal Poly.

There will be data collections in front of campus dining services as well as non-campus dining services to maintain a diverse group of students and not just mainly focused on those students that eat on campus. Around 200 surveys will be administered to students to make sure there is an efficient sample size and to ensure a wide demographic variety of students are being surveyed. The first 100

surveyors will only receive the general Survey1, as seen in Appendix A. This survey will determine knowledge about gluten related subjects along with different demographics. The second 100 will receive the general Survey1 first, a taste test sample of an Udi's gluten free blueberry muffin, and then will be given a follow up sample taste-testing Survey2, as seen in Appendix B, to determine awareness specifically to Udi's company prior to and after sampling the Udi's product. Data collection will take place in the months of February and March of 2013. Two locations will randomly be selected each week in either the month of February or March for a month's time. Surveys will be administered in front of these specific chosen locations. The surveys will take place two separate days in the week they are selected. These days will stay constant throughout the different locations and weeks (i.e. All tests will take place on the Monday and Wednesday of the week they are administered). The results of this survey will provide insight related toward Cal Poly's need to implement more gluten free and UDI's products around the campus, as well as the benefits or giving out samples when implementing a survey.

As displayed in the general Survey1 that consists of seven questions, the first question determines familiarity or prior knowledge and experience with Celiac disease, gluten intolerances, gluten free products, as well as number of times on average the surveyor purchases food on campus. The second and third questions conclude the surveyors' belief of the importance of providing gluten free options on campus, as well as number of times on average the surveyor purchased food on campus. These first three questions will be essential in concluding if the student has

had prior knowledge on the subject and company. It is not necessary for the student to have prior familiarity with these subjects, but will help to determine the reasons for the rest of their answers to the survey. The last four questions are based on the demographics and characteristics of the consumers. These were questions were placed at the end because they are more personal and when conducting a survey it is important to not start off with personal questions first. This will help to figure out why certain students answered the way in which they did and will also allow the ability to see the size and variety of the target market on Cal Poly's campus that would purchase these products. Since the group of surveyed students will range from different ages, genders, and grades, it will be apparent the extent of students whom have an opinion regarding the supply of gluten free and Udi's products and options on campus.

The sample taste-testing Survey2, given to students after they sample the UDI's gluten free muffin consists of seven questions as well. The first two questions ask the surveyor their awareness of UDI's Company before and after they have sampled their product. It is important to know the surveyor's familiarity before and after they have sampled the product to determine the benefits of using sample taste-testing in creating awareness. Although the second question is pretty straightforward it is important in determining the effects of using sample taste-testing when handing out surveys. Question three determines how the surveyor would rate the UDI's product after they sample it. This helps in determining whether or not it is a good idea to give out the product when surveying in order to

increase awareness dependent if the surveyor enjoys the product. If the surveyor rates the product at a high level, taste sampling the product will be beneficial. Question four determines whether or not the surveyor finds it beneficial to substitute gluten free products in their diet. This helps to establish whether or not, they deem gluten free foods beneficial or not to their diet, and in turn will help in deciding whether or not they are likely to buy the product. Question five and six determine how likely the surveyor would be to buy the Udi's gluten free muffin in a Cal Poly campus food store, dining service and/or a grocery store. This will help in determining whether or not students are willing to buy this product in a variety or places and in turn show the potential need to provide Udi's products in these locations as well. The last question asks how much more the surveyor is willing to spend on this particular Udi's gluten free muffin over a non-gluten free muffin. This helps in determining the appropriate prices ranges that students are willing to buy these products.

Procedures for Data Analysis

In order to provide informative results, data from the surveys required appropriate statistical analysis. After a sufficient number of surveys were completed, the results were downloaded from Survey Monkey first into an Excel spreadsheet. After the survey responses are entered in Microsoft Excel's system, the

answers will be collected into tables and charts. The objectives will be answered by putting the various responses into frequency tables. Once this is completed, the most frequent responses the surveyors answer will be determined.

The first objective, as displayed in Appendix A, question one in general Survey1, concludes the frequency of students surveyed that have prior knowledge and understanding on the subject. The next objective determines the surveyor's belief of importance to provide gluten free options on a college campus. The objective for question three's frequency determines the amount of times per month the surveyor purchases food on campus. The last four questions' frequencies, in the first General Survey, will be useful in determining the average consumer and target market to reach when marketing Udi's products. Once these frequencies are concluded, a better understanding of the average or target surveyor will be determined. This information will be useful when presenting the findings to Cal Poly dining services because it will allow them to see where the demand for these products are coming from and the benefits they will maintain through providing gluten free and Udi's products around campus. These frequencies were determined for both the first and second sample populations

As seen in Appendix B, question one and two's frequencies of the sample taste-testing Survey2 determine familiarity with UDI's products before and after the sample taste-testing. This will help in determining the benefits of using sample taste-testing in order to increase awareness. Questions three's frequency determines the rating the surveyor gives the product. Questions four's frequency

determines whether or not the surveyor believes it is beneficial to their health to substitute gluten free products in their diet, which will give explanations to the answers they previously gave. Question five and six's frequencies determine the likelihood the surveyor will buy the product in campus dining and grocery stores. The last question in the sample taste-testing Survey2 will help to conclude the extra amount of money they would be willing to pay for Udi's products. This determines how highly the value the surveyors believe the benefits of Udi's' products to be. In turn these findings will help when in seeing the demand for these products by determining the likelihood the surveyor is to buy the product.

Through the use of the statistical software SPSS version 20, several statistical tests provided constructive analysis to determine if the results fail to reject or reject the hypothesis that the process of using sample taste-testings will increase awareness of gluten intolerances and the importance of providing UDI's gluten free products on Cal Poly's campus.

The first step of the analysis was to evaluate and compare the percent means between the general Survey1 and the first page, or first seven questions, of the sample taste-testing Survey2. This was done by first combining both SPSS results and saving them into one file. Respondents', who completed the general and sample surveys, results were recoded in order to compare the two. Once this was done, a crosstab chi-square test was run between these two, newly recoded surveys and the remaining six questions in both surveys. This was done in order to determine if there were any significant differences between answers given by the two sample

populations on the same questions from both surveys. The subjects referenced in both surveys determined relationships between the differing results of familiarity with celiac disease, gluten intolerance, and gluten free products, belief of importance of providing gluten free options on campus, average monthly on campus food purchasing behavior, whether or not respondents were Cal Poly students, as well as respondents' year in school, age, and gender If there were no significant difference between these questions in both surveys results would be strengthened. A 90% confidence interval was used to determine this information. If the p-value was greater than 0.1, the null hypothesis was accepted and there were no significant differences between the same questions in the surveys' results. If the significant figure, or p-value, was less than 0.1, the null hypothesis was rejected and there was a significant difference between the same questions given in each of the two surveys.

To evaluate and determine the demographics on awareness and the relationship between the factors defining who more familiar, data is was run through another crosstab chi-square test. Before the running of the chi-square, question 1, which determined the surveyor's familiarity with celiac disease, gluten intolerance and gluten free products, was recoded. The respondents' familiarity on each subject was rated on a 5 point scale, (1=never heard of it, 2=heard of it but do not know what it is, 3=somewhat familiar, 4=familiar, and 5=extremely familiar). Responses 1 and 2 were recoded into "not familiar", the non-target market. Responses 3, 4, and 5 were recoded into "familiar", the target market for each

familiarity level of celiac disease, gluten intolerance, and gluten free products. The chi-square tests were run between these three recoded target and non-target market variables and each of the remaining questions on Survey1 and the first page of Survey2. This will conclude whether or not familiarity on gluten related subjects has a relationship or impacts the belief of importance of providing gluten free options on campus, and average monthly on campus food purchasing behavior. Crosstabs will also be run between recoded target and non-target markets and the numerous demographic questions. It will be determined whether or not students at Cal Poly, year in school, age, and gender have a relationship with familiarity of celiac disease, gluten intolerance, and gluten free products. This analysis will be run at a 90% confidence interval. If the p-value was less than 0.1 then the null hypothesis was rejected and there is a relationship between the target or non-target market and the specific question from the survey that is analyzed. If the p-value was more than 0.1, the null hypothesis is accepted, meaning there is no relationship.

The last test was conducted to determine if the actual sampling of the Udi's gluten free blueberry muffin increases awareness of the product and the potential likelihood of use of the product. This analysis was run through crosstab chi-square tests, as well. This analysis focuses solely, as seen in Appendix B, on the second page of Survey2, which is given after the respondent sampled the Udi's product. Both questions 1 and 2 on the survey were recoded to become the target market, which ask familiarity before and after sampling the product. However, the main focus of this analysis was on familiarity after the product is sampled. The respondents'

familiarity before and after sampling the product was rated on a 5 point scale, (1=never heard of it, 2=heard of it but do not know what it is, 3=somewhat familiar, 4=familiar, and 5=extremely familiar). Responses 1 and 2 were recoded into "not familiar", the non-target market. Responses 3, 4, and 5 were recoded into "familiar", the target market. Once these target and non-target markets were recoded, another crosstab chi-square test was run to determine relationships between familiarity before and after the product sampling, rating of the product, health benefits, likelihood to purchase the product on campus, likelihood to purchase the product in a grocery store, and extra money the respondent was willing to spend on the product. The main focus on this section was to determine if tasting the product does in fact increase awareness of the product and likelihood of its use which was based off a 90% confidence interval. If the p-value was less than 0.1, the null hypothesis was rejected and there was a relationship after the product was sampled and awareness and likelihood of use. This same test can be used to determine the demographics of familiarity from this survey as well.

These various tests will have the ability to show Cal Poly students' beliefs of the importance of supplying gluten free and Udi's products on Cal Poly's campus. They will also indicate the demographics of the target market, the probability the students will buy Udi's products, their previous familiarity with these topics, and the ways in which they have become familiar with them. If significant results are found throughout this analysis, it will display the new awareness of the product as well as likelihood of the surveyor to purchase it.

Assumptions

This study assumes that Cal Poly Faculty and Services will allow for student surveys in the specific areas on its campus. The study also assumes all surveyors have answered honestly without biased opinions which may in turn alter results. Due to the short time frame to conduct this study, a limited amount of responses were gathered, which was not reflective of all Cal Poly students or gluten free consumers. This survey was also prohibited to anyone who was not a current student at Cal Poly San Luis Obispo therefore applying to only respondents who attended the school.

Chapter 4

DEVELOPMENT OF THE STUDY

A total of 178 surveys were completed and all surveys were used for data analysis. There were 115 surveys completed for the general survey, which consisted of only seven questions. However, 6 of these surveys were removed from the data because the respondents did not attend Cal Poly, creating a total of 172 useful surveys of all Cal Poly students for data analysis, as well as a total of 109 surveys completed for the general survey. There were 63 surveys completed for the sample taste-testing survey, which consisted of fourteen questions, as well as a sample of an Udi's gluten free blueberry muffin.

Data Collection Problems

There were some problems that occurred with the data collection of this survey. Six of the surveyor respondents did not attend Cal Poly, resulting of those surveys to be removed from the data. Some respondents skipped questions on the survey, which resulted in partially skewed data results from these questions. Lastly, when the percent means of Survey1 and the first page of Survey2 were compared, some significant differences between the findings did take place.

Analysis

General Survey1 Frequencies

Of the 109 respondents who completed the first, general survey, 56 (51.4%) were female, and 53 (48.9%) were male. The ages of respondents range from 17 to 27. Out of the 109 respondents, 47 (43.1%) were between the ages of 17 to 20. There were 54 (49.5%) respondents, the largest age group of respondents, whose ages range from 21 to 24. Lastly, there were 8 (7.3%) respondents whose ages range from 25 to 27. Demographics of the age and gender for the total surveyed respondents can be seen in Figure 1 and 2 below.

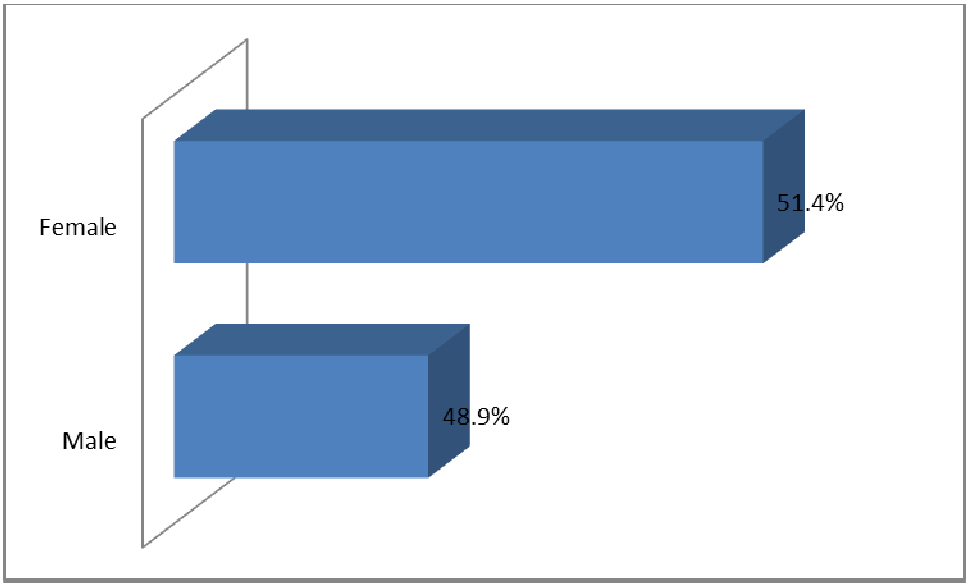

Figure 1. Percent of Female and Male Respondents in General Survey1.

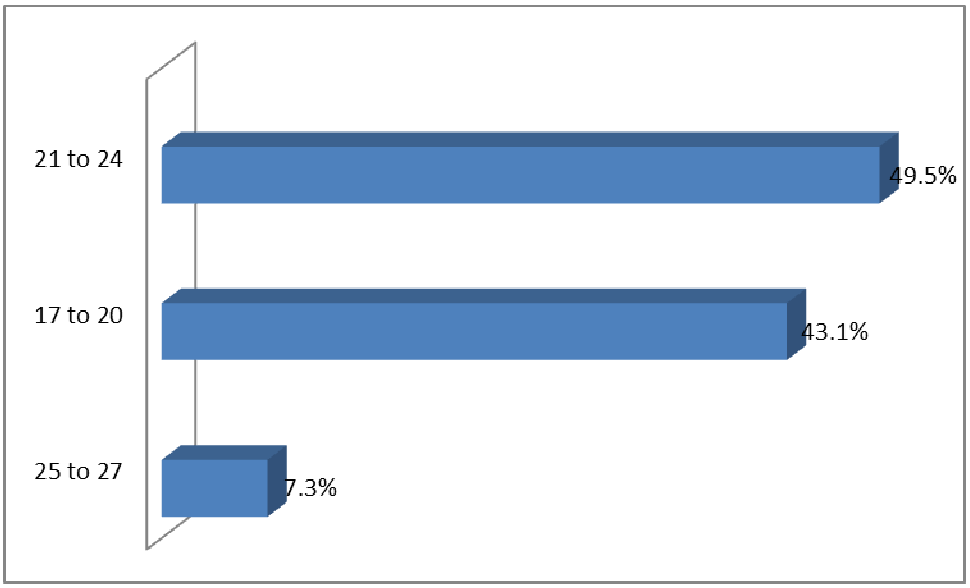

Figure 2. Percent of Age Ranges of Respondents in General Survey1.

Of the 109 respondents, 40 (36.7%) are in their 4th year at Cal Poly. There were 21 (19.3%) and 20 (18.3%) of respondents are attending their 2nd and 3rd years at Cal Poly. 12 (11%) of respondents are in their 1st year at Cal Poly, and 10 (9.2%) are in their 5th year. Of the 109 respondents, 6 (5.5%) selected N/A because they did not attend Cal Poly and their results were removed from the data analysis. Students in their 4th year at Cal Poly were the largest group of respondents in this survey as shown in Table 1 below.

Table 1. Respondents Year in School in General Survey1.

Year in School	Response Percent	Response Count
1st year	11.0%	12
2nd year	19.3%	21
3rd year	18.3%	20
4th year	**36.7%**	**40**
5th year	9.2%	10
N/A	5.5%	6

As displayed in Table 2 below, when asked about familiarity of Celiac Disease, 29% of respondents, the largest number of demographic, had heard of it but did not know what is was. When questioned about familiarity of gluten intolerance, 37% said they were familiar. 30% of respondents were extremely familiar with gluten free products.

Table 2. Familiarity with Gluten Related Subjects in General Survey1.

	Never heard of it	Heard of it but do not know what it is	Somewhat Familiar	Familiar	Extremely Familiar
Celaic Disease	21%	**29%**	15%	24%	11%
Gluten Intolerance	5%	11%	27%	**37%**	21%
Gluten Free Products	2%	11%	29%	28%	**30%**

When asked about the importance of providing gluten free options to students with gluten intolerance on a college campus, 40 (37.0%) of respondents found it very important. Of the 109 respondents, 32 (29.3%) found it extremely important and 31 (28.4%) found it important. Only 5 (4.6%) of respondents found providing gluten free options as not very important and there were no respondents who believed it was not important at all. The number of respondents totaled 108

students because one respondent skipped this question. A visual of respondents' belief of importance can be seen below in Figure 3.

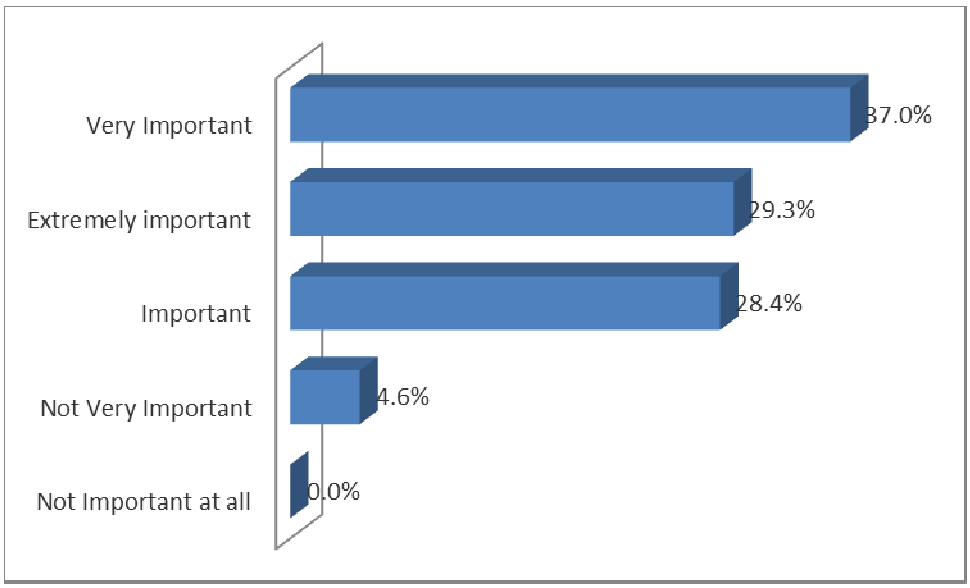

Figure 3. Importance of Providing Gluten Free Options in General Survey1.

When asked how often respondents purchase food on campus, 35 (32.1%) said they purchase food 0-5 times a month. 21 (19.3%) said they purchase either 6-10 times or 7-15 times a month. 13 (11.9%) respondents said they purchase either 16-20 times or 21 or more times a month. 6 (5.5%) respondents did not purchase food on campus. A table of respondent's average purchasing behavior of food on campus can be seen in Table 3 below.

Table 3. Average Purchasing Behavior of On-Campus Food in General Survey.

Average Monthly Purchasing Behavior of On-Campus Food	Response Percent	Response Count
0-5 times a month	32.1%	35
6-10 times a month	19.3%	21
7-15 times a month	19.3%	21
16-20 times a month	11.9%	13
21+ times a month	11.9%	13
I do not purchase food on campus	5.5%	6

Sample Taste-Testing Survey2 Frequencies

Of the 63 respondents who completed the second, sample taste-testing Survey2, 43 (68.3%) were female and 20 (31.7%) were male. The ages of respondents who completed this survey range from 17 to 27. Out of the 63 respondents 30 (47.6%) were between the ages of 17 to 20. (44.4%) were between the ages 21 to 24, and 5 (7.9%) ages ranged from 25 to 27. Demographics of the age and gender for these surveyed respondents can be seen in Figure 4 and 5 below.

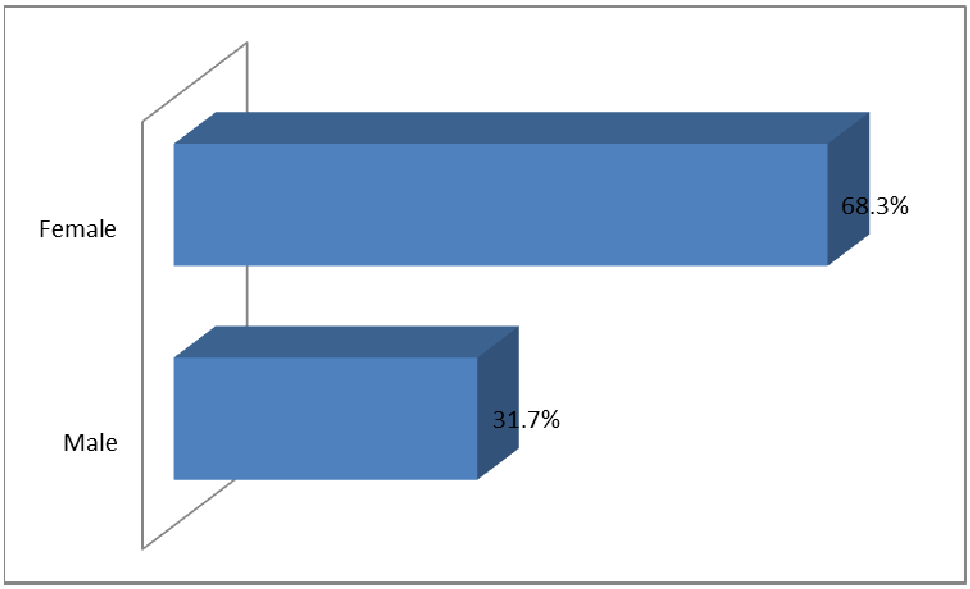

Figure 4. Percent of Female and Male Respondents in Taste-testing Survey2.

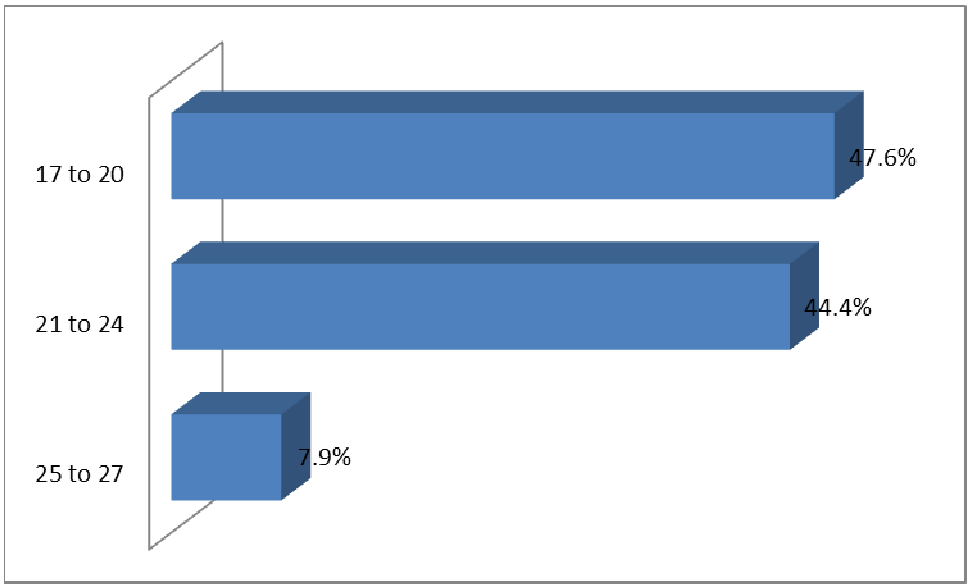

Figure 5. Percent of Age Ranges of Respondents in Taste-testing Survey2.

Of the 63 respondents, 16 (25.8%) are in their 3rd year at Cal Poly. These students comprise of the biggest group of surveyed respondents in this category. Followed by 3rd year students, 15 (24.2%) of students surveyed are in their 4th year and 14 (22.6%) are in their 2nd year. 12 (19.4%) respondents are in their 1st year at Cal Poly, and 5 (8.1%) are in their 5th year. A visual representation of students' year in school is shown below in Table 4.

Table 4. Respondents Year in School Taste-testing Survey.

Year in School	Response Percent	Response Count
1st	19.4%	12
2nd	22.6%	14
3rd	**25.8%**	**16**
4th	24.2%	15
5th	8.1%	5

Shown below in Table 5 are the largest demographics of familiarity of gluten related subjects. When asked about familiarity of Celiac Disease, 29%, the largest demographic of respondents, were somewhat familiar. When questioned about familiarity of gluten intolerance, 40% said they were familiar. 35% of respondents were somewhat familiar with gluten free products.

Table 5. Familiarity with Gluten Related Subjects in Taste-testing Survey.

Answer Options	Never heard of it	Heard of it but do not know what it is	Somewhat Familiar	Familiar	Extremely Familiar
Celiac Disease	18%	31%	**23%**	21%	8%
Gluten Intolerance	3%	19%	25%	**40%**	13%
Gluten Free Products	5%	17%	**35%**	32%	11%

When asked about the importance of providing gluten free options to students with gluten intolerance on a college campus, 23 (36.5%) of respondents found it very important. Of the 63 respondents, 22 (34.9%) found it extremely important and 15 (23.8%) found it important. Only 3 (4.8%) of respondents found providing gluten free options as not very important and there were no respondents who believed there was no importance at all. A visual of respondents' belief of importance can be seen below in Figure 6.

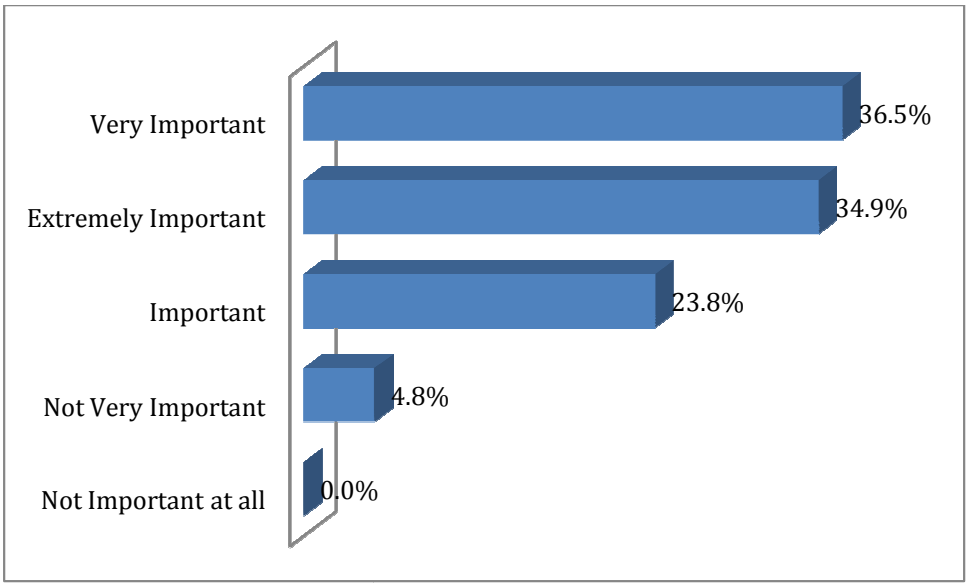

Figure 6. Importance of Providing Gluten Free Options in Tate-Testing Survey2.

When asked how often respondents purchase food on campus, 18 (28.5%) said they purchase food 0-5 times a month. 14 (22.6%) said they purchase either 11-15 times a month. 12 (19.4%) respondents said they purchase 21 or more times a month. 8 (12.9%) respondents purchase food on campus 6-10 times a month and 6 (9.7%) purchase 16-20 times. 5 (8.1%) respondents do not purchase food on campus. A table of respondent's average purchasing behavior of food on campus can be seen in Table 6 below.

Table 6. Average Purchasing Behavior of On-Campus Food in Taste-testing Survey2.

Average Monethly Purchasing Behavior of On-Campus Food	Response Percent	Response Count
0-5 times a month	28.5%	18
11-15 times a month	22.6%	14
21+ times a month	19.4%	12
6-10 times a month	12.9%	8
16-20 times a month	9.7%	6
I do not purchase food on campus	8.1%	5

Of the 63 respondents, 39 (62.0%) prior to sampling the Udi's gluten free blueberry muffin, had "never hear of" or had "heard of but did not know what it is" Udi's gluten free products. Conversely, after sampling the gluten free muffin, 52 of the 63 respondents (82.5%) felt "familiar" to "extremely familiar" with Udi's gluten free products. The importance of creating awareness when providing sample taste-testings can be seen through these results in Table 7 below.

Table 7. Familiarity with Udi's Before and After Sample.

	Familiarity Prior to Taste Test	Response Count	Familiarity After Taste Test	Response Count
Never heard of it	**33.9%**	**21**	0.0%	0
Heard of it but do not know what it is	**29.0%**	**18**	3.2%	2
Somewhat Familiar	19.4%	12	14.5%	9
Familiar	11.3%	7	**37.1%**	**23**
Extremely Familiar	7.9%	5	**46.0%**	**29**

After sampling the Udi's gluten free blueberry muffin, surveyors were asked to rate the product on a 5 point scale, "did not like", "not very good", "neutral", "good", and "very good". 27 respondents (44.4%) rated the muffin as very good and 22 (34.9%) rated it as good. Only 10 respondents (20.7%) rated the product as neutral, not very good, or did not like it. These results are displayed in Figure 7 below and help to determine how well the product was liked in regard to taste.

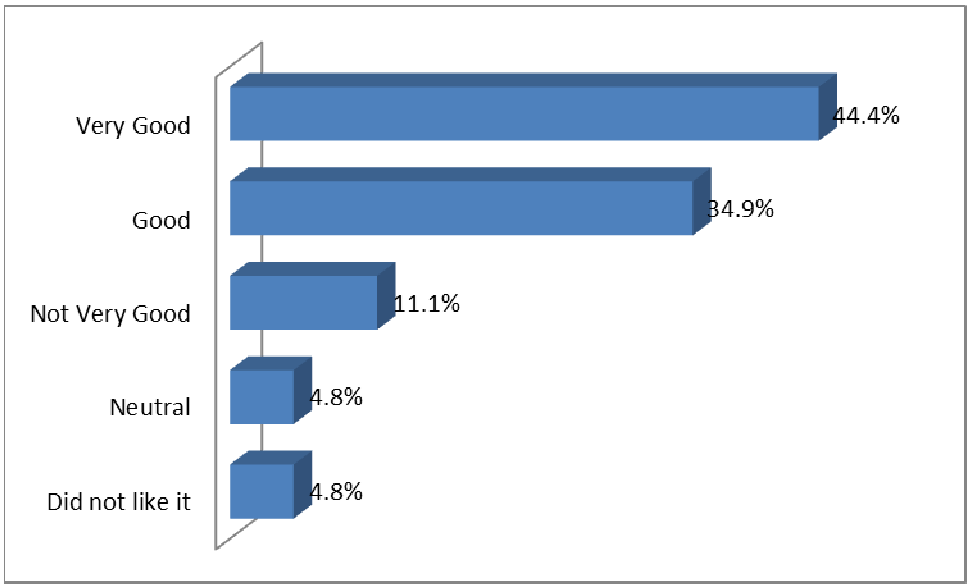

Figure 7. Rating of the Gluten Free Product.

After sampling the product, surveyors were asked to determine if they believe sampling gluten free products into their diet is beneficial to one's health. Over half of respondents agree or completely agreed with the statement. However, there was still a significant amount that was neutral or did not agree. The frequencies of these responses are shown below in Figure 8.

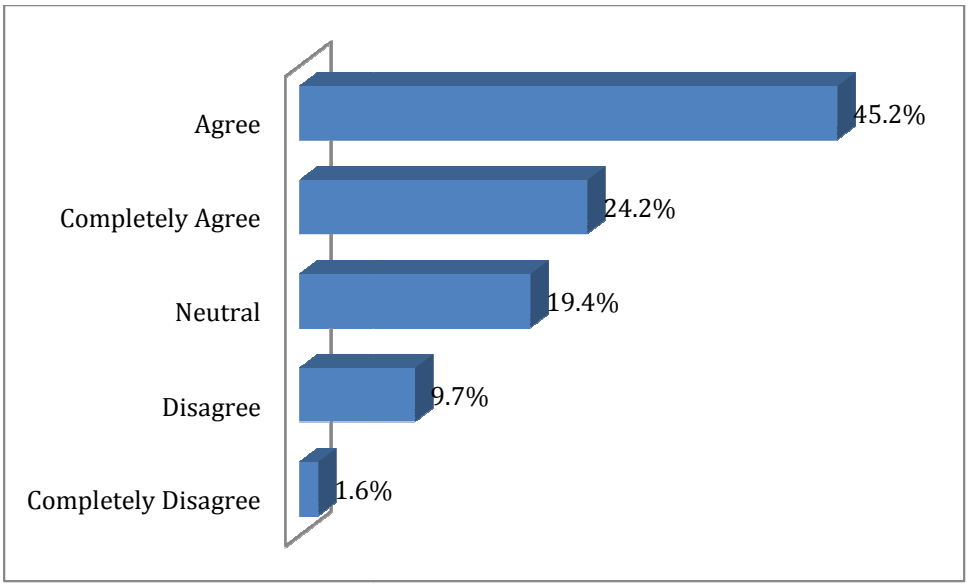

Figure 8. Health Benefits.

Question 12 and 13 determined the likelihood the respondent was to purchase the sampled product in an on campus store or dining service versus in a grocery store. Respondents were mostly even in responses when determining where they were more likely to purchase the product. Almost 40% of surveyors said they were very likely to purchase in a grocery store. Slightly less, 34.4% said they were very likely to purchase on campus. These results may be due to significant number of students who do not purchase food on campus often, or at all. The rest of the results are displayed below in Figure 9.

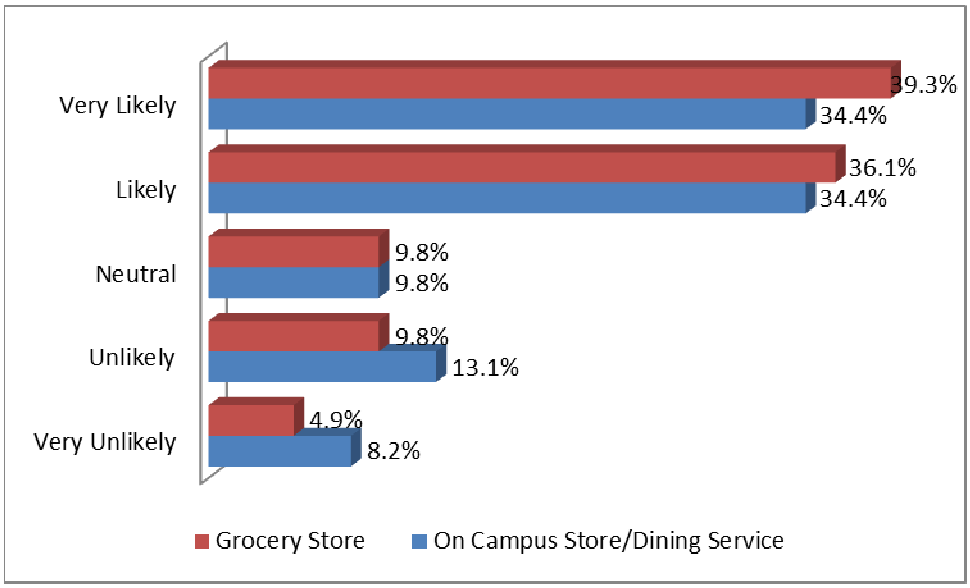

Figure 9. Likelihood to Purchase.

The last question in the survey determined the extra added cost surveyors were willing to pay for the gluten free muffin. Of the 63 respondents, 25.8% stated they were not willing to pay extra money for the product. However, 45.1% were willing to pay $0.25-$1.00 extra for the product. The remaining results may be seen in Figure 10 below.

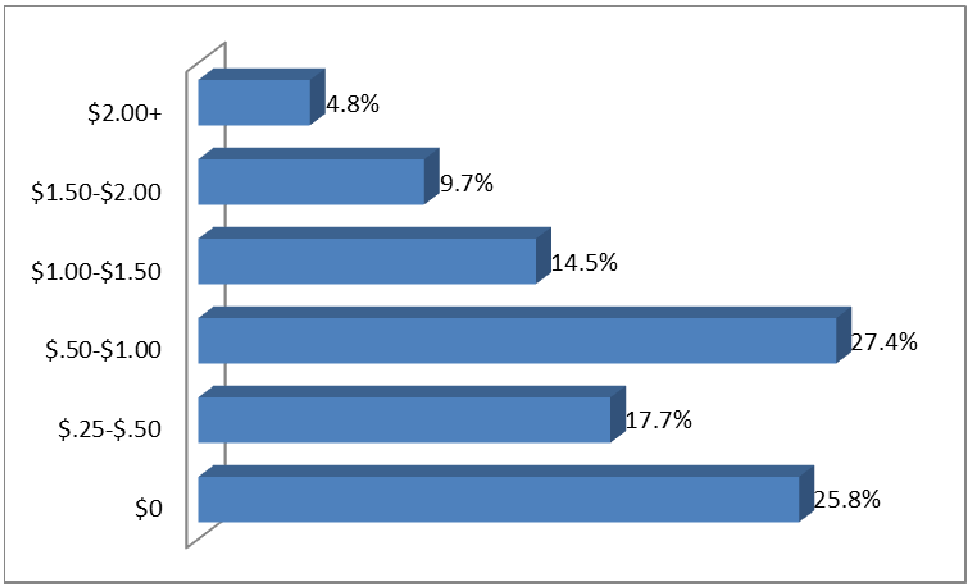

Figure 10. Extra Cost Willing to Spend.

Comparing Descriptive Percent Means

After descriptive demographics were run for each survey, the next step in analyzing results was comparing percent means of the two surveyed groups; the first, given only the first general survey and the second, who were given the first page of the general Survey1, a sample of an Udi's gluten free muffin, as well as a follow up sample taste-testing Survey2. The data results for both surveys were combined into one file and then downloaded through SPSS. Results for the general survey were then compared to results from the sample-taste-testing survey through crosstab chi-square tests to determine relationships for each of the seven matching questions on both surveys.

Although percent means were not always identical in both surveys, due to differing sample sizes, after running the chi squared tests, there were no significant

differences in questions determining respondent familiarity with celiac disease and gluten intolerance. There were also no significant differences between survey questions on the importance of providing gluten free options on campus, the average monthly purchasing behavior of food on campus, if the respondent was a Cal Poly student, their year in school, and the age of the respondent.

However, after running the crosstab chi-square test, it was determined that two questions answered by surveyors in both sample groups did in fact express significant differences. Familiarity of gluten free products respondents of the two different surveys were deemed to have a significant difference, with a p-value of 0.053. The first survey group, which consisted of students that were only given the general Survey1, had the largest sample size with 33 out of 109 students (30.3%) responding that were extremely familiar with gluten free products. The second sample group, who were given the general survey, a sample of an Udi's gluten free blueberry muffin, and then a follow up survey had the largest same size, with 22 out of 63 (35.0%) students responded that they were somewhat familiar with gluten free products. Because these numbers show a significant difference it may be inferred that the sample populations of both surveys did not answer this question the same. There was a difference between Survey1 and Survey2's responses and their familiarity of gluten free products. The sample population from Survey2 had a larger base percent of familiarity of gluten free products than of that in the Survey1 population, as seen in Table 8 below.

Table 8. Compared Familiarity of Survey1 and Survey2

			Familiarity	
			General Survey1	Sample Survey2
Gluten Free Products	Never heard of it	Count	2	3
		% within Familiarity	1.8%	4.8%
	Heard of it but do not know what it is	Count	12	11
		% within Familiarity	11.0%	17.5%
	Somewhat Familiar	Count	32	22
		% within Familiarity	29.4%	34.9%
	Familiar	Count	30	20
		% within Familiarity	27.5%	31.7%
	Extremely Familiar	Count	33	7
		% within Familiarity	30.3%	11.1%
Total		Count	109	63
		% within Familiarity	100.0%	100.0%

Another significant difference found in the question of gender, with a p-value of 0.027. The first sample group of males who completed Survey1 consisted of 53 of 109 respondents (48.9%) and there were 20 of 63 respondents (31.7%) who completed Survey2. The Survey1 population group consisted of 56 of 109 (51.4%) females, and the Survey2 population group consisted of 43 of 63 female respondents (68.3%). This displayed that there was a significantly larger number of female respondents in Survey2's sample population as well as a larger sample population of males in Survey1's sample population.

These conclusions may slightly have weakened results, however, the results should not be deemed extremely significant in that it is expected that there was potential for differences between sample population demographics.

Demographics of Awareness in General Survey1

An analysis of demographics on awareness of celiac disease, gluten intolerance, and gluten free products was done next to determine if there is a relationship between factors and who is more familiar. The first question in the general Survey1, as shown in Appendix A, was first recoded into different variables in order to govern the demographics of this data. Each subject; celiac disease, gluten intolerance, and gluten free products, was recoded so that the target market, familiar, consisted of respondents who marked "somewhat familiar", "familiar", or "extremely familiar". The non-target respondents, referred to as not familiar, were recoded to consist of surveyors who marked "never heard of it" or "heard of it but do not know what it is". After the recoding of the target and non-target market was completed, a crosstab chi-squared test was run between each recoded, familiarity subject and the remaining questions on the general survey.

Of the 108 respondents who answered question two, there were relationships between the believed importance of providing gluten free options to those with gluten intolerance on a college campus and their familiarity of the gluten free subjects. This displays that there is a difference between the target, familiar,

and non-target, not familiar, markets when determining the importance of providing gluten free options.

27 of the 53 (50.9%) surveyors believe it extremely important to provide gluten free options on a college campus, in the familiar target market specific to celiac disease, with a significant difference of 0.000. Target market respondents who were familiar with gluten intolerance responded the highest 38 out of 91 (41.8%) students believe it is very important to provide gluten free options with a significant difference of 0.000. 38 out of 94 (40.4%) of students familiar with gluten free products believe it very important to provide gluten free options. Overall, this data conveys that the more familiar the respondent is with the gluten related subject, the more important they believe it is to provide gluten free options on campus. The relationship between familiarity of gluten related subjects and the importance of providing gluten free options on campus can be seen below in Table 9.

Table 9. Importance of Providing Gluten Free Options on a College Campus.

			Celiac Disease			Gluten Intolerance			GlutenFree Products		
			Non-Target (Not Familiar)	Taget (Familiar)	Total	Non-Target (Not Familiar)	Taget (Familiar)	Total	Non-Target (Not Familiar)	Taget (Familiar)	Total
	Not Very Important	Count	5	0	5	4	1	5	4	1	5
		% within Celiac	9.1%	0.0%	4.6%	23.5%	1.1%	4.6%	28.6%	1.1%	4.6%
	Important	Count	23	8	31	11	20	31	8	23	31
		% within Celiac	41.8%	15.1%	28.7%	64.7%	22.0%	28.7%	57.1%	24.5%	28.7%
	Very Important	Count	22	18	40	2	38	40	2	38	40
		% within Celiac	40.0%	34.0%	37.0%	11.8%	41.8%	37.0%	14.3%	40.4%	37.0%
	Extremely important	Count	5	27	32	0	32	32	0	32	32
		% within Celiac	9.1%	50.9%	29.6%	0.0%	35.2%	29.6%	0.0%	34.0%	29.6%
Total		Count	55	53	108	17	91	108	14	94	108
		% within Celiac	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Next, another crosstab chi-squared test was run to determine if there was a relationship between average monthly on campus food purchasing behavior and familiarity with the gluten related subjects. Of the 109 total surveyed respondents, relationships were found between purchasing behavior and familiarity of gluten intolerance as well as gluten free products. There was no relationship found between familiarity of celiac disease and purchasing behavior.

Students who purchase food on campus 0-5 times a month and were also familiar with gluten intolerance made up the largest percentage, 30.4%, of the target market, with a p-value of 0.058. Respondents that purchase food on campus 0-5 times a month and were familiar with gluten free products also made up the largest percentage, 32.6%, of the target market, with a p-value of 0.002. Results show, when only looking at the target market, students that are familiar with gluten

intolerance or gluten free products, that students purchase food on campus 0-5 times a month. The relationship between these gluten related subjects and purchasing behavior is displayed in Table 10 below.

Table 10. Target Market Average Monthly On Campus Purchasing Behavior.

			Gluten Intolerance			Gluten Free Products		
			Non-Target (Not Familiar)	Taget (Familiar)	Total	Not Familiar	Familiar	Total
	0-5 times a month	Count	7	28	35	4	31	35
		% within Gluten	41.2%	30.4%	32.1%	28.6%	32.6%	32.1%
	6-10 times a month	Count	3	18	21	1	20	21
		% within Gluten	17.6%	19.6%	19.3%	7.1%	21.1%	19.3%
	7-15 times a month	Count	0	21	21	0	21	21
		% within Gluten	0.0%	22.8%	19.3%	0.0%	22.1%	19.3%
	16-20 times a month	Count	5	8	13	6	7	13
		% within Gluten	29.4%	8.7%	11.9%	42.9%	7.4%	11.9%
	21+ times a month	Count	2	11	13	3	10	13
		% within Gluten	11.8%	12.0%	11.9%	21.4%	10.5%	11.9%
	I do not purchase food on	Count	0	6	6	0	6	6
		% within Gluten	0.0%	6.5%	5.5%	0.0%	6.3%	5.5%
Total		Count	17	92	109	14	95	109
		% within Gluten	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Relationships were seen in familiarity with gluten free products and the respondent's year in school as well as their age. Of the 95 total target market respondents, familiar with gluten free products, were most often in their 4th year at Cal Poly, 38 of 95 (40%) of target market respondents, with a p-value of 0.017. Only 2 respondents who were in their 4th year at Cal Poly were not in the target market.

There was no relationship between familiarity of celiac disease or gluten intolerance and year in school. 54 (56.8%) of the target market respondents were between the ages of 21 to 24, with a p-value of 0.000. Of those 54 respondents all were considered part of the target market. These results show that the largest numbers of the target market, or "familiar", students are in their 4th year at Cal Poly and between the ages of 21 to 24. There were no relationships between familiarity of celiac disease or gluten intolerance and age. The familiarity and year in school relationship can be seen below in the highlighted section of Table 11. The familiarity and age demographic relationship can be seen in highlighted section of Table 12 below.

Table 11. Target Market and Year in School Relationship.

			Gluten Free Prodcuts		
			Not Familiar	Familiar	Total
	1st year	Count	4	8	12
		% within GlutenFree	28.6%	8.4%	11.0%
	2nd year	Count	6	15	21
		% within GlutenFree	42.9%	15.8%	19.3%
	3rd year	Count	2	18	20
		% within GlutenFree	14.3%	18.9%	18.3%
	4th year	Count	**2**	**38**	**40**
		% within GlutenFree	**14.3%**	**40.0%**	**36.7%**
	5th year	Count	0	10	10
		% within GlutenFree	0.0%	10.5%	9.2%
	N/A	Count	0	6	6
		% within GlutenFree	0.0%	6.3%	5.5%
Total		Count	14	95	109
		% within GlutenFree	100.0%	100.0%	100.0%

Table 12. Target Market and Age Relationship.

			Gluten Free Products		
			Not Familiar	Familiar	Total
	17 to 20	Count	12	35	47
		% within GlutenFree	85.7%	36.8%	43.1%
	21 to 24	Count	0	54	54
		% within GlutenFree	0.0%	56.8%	49.5%
	25 to 27	Count	2	6	8
		% within GlutenFree	14.3%	6.3%	7.3%
Total		Count	14	95	109
		% within GlutenFree	100.0%	100.0%	100.0%

Demographics of Awareness Before and After Sampling

The last and primary interest of analysis focused on the effects of sample taste-testing the Udi's gluten free muffin in regards to increased awareness and likelihood to purchase. This data was analyzed by first recoding question 2 on the second page of Survey2 that asked about surveyors' familiarity after sampling the product. Once this data was downloaded through SPSS, this question was recoded into the target and non-target market and was compared to the remaining five questions. Question 2 gave the surveyors to rate familiarity on the same 5 point scale as previous questions in the survey. The question was recoded so that the target market, familiar, consisted of respondents who marked "somewhat familiar", "familiar", or "extremely familiar" after sampling the product. The non-target respondents, referred to as not familiar after sampling the product, were recoded to consist of surveyors who marked "never heard of it" or "heard of it but do not know what it is".

Once the recoding was completed a crosstab chi-square test was run between surveyors responses on their rating of the product, believed health benefits of substituting gluten free foods into one's diet, likelihood to purchase on campus or at a grocery store, and extra costs willing to spend on the product. The chi-square tests were analyzed at a 90% confidence interval, meaning if the p-value was less than 0.1, the null hypothesis was rejected and there was a relationship between the familiarity after sampling and the remaining questions on the survey.

Findings after running this test concluded there were relationships between many of the factors, with a p-value of 0.001. As seen in Table 13 below, the rating of the taste of the product was increased with an increase in familiarity.

Table 13. Relationship between Rating of Product and Familiarity After Sampling.

			After		P-Value
			Non Target (Not Familiar)	Target (Familiar)	
After sampling this Udi's product how would you rate it?	Did not like it	Count	1	2	**0.001***
		% within After	33.3%	3.3%	
	Not Very Good	Count	0	7	
		% within After	0.0%	11.7%	
	Neutral	Count	2	2	
		% within After	66.7%	3.3%	
	Good	Count	0	22	
		% within After	0.0%	3637.0%	
	Very Good	Count	0	27	
		% within After	0.0%	45.0%	
Total		Count	3	60	
		% within After	100.0%	100.0%	

The next crosstab chi-square was run to compare the relationship between belief of health benefits of gluten free products and familiarity after sampling the product. Of the respondents surveyed, an increased familiarity increased the belief of health benefits of substituting gluten free products into one's diet. This relationship was confirmed by the p-value of 0.000 when the chi-square test was run. A large majority of target market, extremely familiar to somewhat familiar; respondents agreed or completely agreed that substituting gluten free options was beneficial to one's health. Comparisons between target and non-target familiarities after sampling the product and health benefits may be seen below in Table 14.

Table 14. Relationship between Health Benefits and Familiarity After Sampling.

			After		P-Value
			Non Target (Not Familiar)	Target (Familiar)	
Do you agree that substituting gluten free products in a diet is beneficial to one's health?	Completely Disagree	Count	1	0	**0.000***
		% within After	33.3%	0.0%	
	Disagree	Count	2	5	
		% within After	66.7%	8.3%	
	Neutral	Count	0	12	
		% within After	0.0%	20.0%	
	Agree	Count	0	28	
		% within After	0.0%	46.7%	
	Completely Agree	Count	0	15	
		% within After	0.0%	25.0%	
Total		Count	3	60	
		% within After	100.0%	100.0%	

Another chi-square test was run, at a 90% confidence interval, to conclude the relationship between familiarity after sampling the product and likelihood to purchase. This question presented the main results in proving the hypothesis of this experiment. A p-value of 0.000 was conclude in the test run on the likelihood to purchase in an on campus dining facility, displaying the relationship between likelihood to purchase and familiarity. The more likely the respondent was to purchase the product, the more familiar they were with the product due to sampling it. When the test was run on the likelihood to purchase in a grocery store, the results computed a p-value of 0.008, meaning there was a relationship between the increase familiarity after sampling the product and the likelihood of purchasing the product in a grocery store. When comparing the location of the likelihood to purchase 24 out of the 59 (40.7%) respondents in the target market said they were very likely to purchase the product in a grocery store. Slightly less, 21 out of the 59

(35.6%), were very likely to purchase on campus. This may be due to the small number or on-campus dining purchasers surveyed, but it is important that an increase in awareness maintains a relationship with the likelihood to purchase the product. These results are exhibited below in Table 15.

Table 15. Relationship between Likelihood to Purchase and Familiarity After Sampling.

			Campus Dining		P-Value	Grocery Store		P-Value
			Non Target (Not Familiar)	Target (Familiar)		Non Target (Not Familiar)	Target (Familiar)	
If this Udi's product was avaliable, how likely would you be to purchase in each location?	Very Unlikely	Count	3	3	**0.000***	1	2	**0.008***
		% within After	75.0%	5.1%		25.0%	3.4%	
	Unlikely	Count	0	8		2	5	
		% within After	0.0%	13.6%		50.0%	8.5%	
	Neutral	Count	1	6		1	6	
		% within After	25.0%	10.2%		25.0%	10.2%	
	Likely	Count	0	21		0	22	
		% within After	0.0%	35.6%		0.0%	37.3%	
	Very Likely	Count	0	21		0	24	
		% within After	0.0%	35.6%		0.0%	40.7%	
Total		Count	4	59		4	59	
		% within After	100.0%	100.0%		100.0%	100.0%	

The last chi-square test which was run determined the relationship between the added cost the respondent was willing to spend on the Udi's gluten free muffin and their familiarity after sampling the product. Again, this test was run at a 90% confidence interval level, if the p-value was less than 0.01 the null hypothesis was rejected and results were significantly different, displaying a relationship between familiarity and extra costs. This test resulted in an insignificant relationship with a p-value of 0.312, greater than 0.1, which concluded there was no relationship between the various levels of extras costs respondents were willing to pay and their familiarity before or after sampling the product.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

In summary, the hypothesis that sample taste-testings will increase awareness of gluten free products and the likelihood to purchase Udi's gluten free products deemed partially true. After sampling the Udi's gluten free blueberry muffin, the Cal Poly students surveyed displayed an increased awareness of gluten free products and an increased likelihood to purchase the product on campus and at a grocery store. However while likelihood to purchase the product on campus was high, after sampling the product and increasing their familiarity, respondents displayed a greater interest to purchase Udi's products in a grocery store rather than than on campus.

Conclusion

After determining general awareness of gluten intolerances and general gluten free products, the sample-taste testing aided to the increase of respondents' familiarity with Udi's gluten free products as well as their belief of importance of the product and the rating of the taste of the product. The more familiar the respondent felt with the product, the more likely they were to purchase the product. However, the respondents' likelihood to purchase Udi's products at an on campus dining store was not as large as that of the likelihood to purchase at a grocery store.

These findings mean that surveyors were more likely to purchase the Udi's product in a grocery store than on campus. This displays it remains important to provide gluten free options in both locations, yet, students surveyed at Cal Poly are more likely to purchase the product at an off campus grocery store

Recommendations

Based on the findings from this study, it was recommended that future researchers gather a much larger data collection to get a more evenly distributed sample so that results were not skewed. It was also recommended to include a wider range of a sample population, aside from solely Cal Poly students to provide results of persons' in the general San Luis Obispo area.

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